AMENDMENTS TO DRAWINGS:

The attached sheet of drawings includes changes to FIGS. 1, 3A-D, 4A, 4B-C, 5, 6A-C, 7A-C, and 8. These sheets replace the original sheets including FIGS. 1, 3A-D, 4A, 4B-C, 5, 6A-C, 7A-C, and 8. In FIG. 1 the positions of elements y_3 and y_4 have been swapped. In FIGS. 3A-D, 4A, 4B-C, 5, 6A-C, 7A-C, and 8 the replacement figures replace the orginal figures which having scanning errors.

REMARKS

Claims 1-37 and 39-42 are pending in this application. Claims 7 and 8 were objected to for failing to provide proper antecedent basis for the claimed subject matter. Applicants respectfully request that this rejection be withdrawn. Applicants respectfully submit that claims 7 and 8 are fully supported by the original specification through paragraph 34 of pages 11 and 12. In particular, equations 10 and 11 fully support this feature. However, in order to further move along prosecution, the Applicants have amended paragraph 34 to specify the terms horizontal direction variable and vertical direction variable. Claims 11 and 17 have been amended to further define the invention. Claims 38 and 43 have been cancelled. The specification has been amended to address the Examiner's objections to FIGS. 5 and 9. The specification has been further amended to address the Examiner's objections under 35 USC 101. Even thought the Applicants believe an electromagnetic wave carrier is patentable subject matter, the reference to the electromagnetic wave carrier has been removed from the specification so that prosecution may move forward. Accordingly, Applicants request that this rejection of claims 17-26 be withdrawn. FIG. 1 has been amended to illustrate the clockwise position. A replacement sheet is attached hereto. No new matter has been entered by these amendments.

FIGS. 3A-D, 4A, 4B-C, 5, 6A-C, 7A-C, and 8 are identical to the figures originally submitted and have been submitted solely to correct for scanning errors in the image file wrapper. No new matter has been added.

Rejections under 35 U.S.C. § 102

Applicants respectfully request reconsideration of the rejection of claims 1, 3, 4, 9, 10, 17, 19, 20, 22, 33, 35, 36 and 38 under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,408,109 to William SILVER et al. (hereinafter Silver).

The Examiner asserts that Silver discloses all of the features of independent claim 1. Claim 1, includes the feature of applying a weighted interpolation scheme to a value corresponding to the pixel location when the direction is a horizontal direction or a vertical direction. The Examiner asserts that Silver discloses this feature and refers to column 3, lines 58-61. The Applicants respectfully disagree with this assertion as nowhere in Silver is a weighted interpolation scheme applied

when the direction is a horizontal direction or a vertical direction. As a matter of fact, nowhere does Silver mention identifying a vertical or horizontal direction. The cited section refers to identifying whether the gradient magnitude along the profile are collinear, which has nothing to do with applying a weighted interpolation scheme when the direction is a horizontal direction or a vertical direction. Applicants respectfully request that the Examiner clarify if the Examiner is using collinear gradient magnitudes to refer to a horizontal or vertical direction of a pixel location, as the concepts are unrelated. Since Silver never determines whether the pixel location is a vertical or horizontal edge, it cannot be reasonably asserted that Silver discloses applying a weighted interpolation scheme to a value corresponding to the pixel location when the direction is a horizontal direction or a vertical direction. In addition, nowhere does Silver disclose applying a weighted interpolation in a method for upscaling image data. Silver is concerned with edge detection and not with upscaling image data. The section of Silver cited above by the Examiner uses a curve fitting method of interpolation to estimate the subpixel position of the gradient magnitude peak. The Applicants fail to see how this discloses applying a weighted interpolation scheme when the pixel location is associated with a horizontal or vertical direction. Accordingly, for at least these reasons claim 1 is not anticipated by Silver. Claims 3, 4, 9 and 10 depend from claim 1 and are patentable for at least the above stated reasons.

Claim 17 includes the feature of program instructions for applying a weighted interpolation scheme to the pixel location when the direction is one of a horizontal direction and a vertical direction. As stated above with regard to claim 1, Silver fails to disclose this feature. Thus, claim 17 and dependent claims 19, 20 and 22 are not anticipated by Silver for at least these reasons.

Claim 33 includes the feature of logic for applying a weighted interpolation scheme to the pixel location when a) the direction is both a horizontal direction or a vertical direction and b) the gradient value exceeds a threshold value. The Examiner refers to column 33, lines 42-44 as disclosing this feature. The cited section refers to an embodiment where a noise threshold is used and any gradient peaks whose magnitude falls below the threshold are not considered edges. Again, nowhere is there mention of applying a weighted interpolation when the pixel location is one of a horizontal direction or a vertical direction. Silver is concerned

with detecting edges and is not concerned whether the edge is horizontal or vertical. The gradient direction in Silver is used to force the magnitude estimates in a line passing through G_0 (see column 3, line 56 through column 4, line 13) and not as a basis for applying a weighted interpolation scheme. Accordingly, claim 33 and dependent claims 35 and 36 are allowable for at least the above stated reasons.

Rejections under 35 U.S.C. § 103

Claims 2, 5-8, 18, 21, 34 and 37 were rejected as being unpatentable over Silver in view of US Patent 5,991,464 issued to Pohsiang HSU et al. (hereinsafter Hsu). Claims 11-15, 23-32 were rejected as being unpatentable over US Patent 6,298,090 to Kiran CHALLAPALI (hereinafter Challapali) in view of Silver. Applicants respectfully request that this rejection be withdrawn in light of the arguments presented herein.

Claim 11 has been amended to include the feature of applying a weighted interpolation scheme adaptively to each pixel location within the block of image data of the current frame based upon a direction associated with the pixel location and the level of difference between the current frame and the previous frame. Support for this amendment may be found in paragraph 45 of the application. The Examiner has acknowledged that Challapali fails to teach the above feature and asserts that Silver teaches the feature prior to this amendment. Silver is directed to a single frame of image data and does not disclose the features of claim 11 as amended. In addition, the Applicants respectfully disagree that Silver teaches applying a weighted interpolation scheme adaptively to each pixel location within the block of image data. Silver does not apply a weighted interpolation adaptively based on the direction and the level of difference between frames, as Silver never considers multiple frames. As mentioned above Silver is directed to detecting edges in image data. Challapali detects redundant images in a video sequence. The present claims are directed to upscaling image data as specified in amended claim 11.

Claim 12 includes the feature of copying upscaled data representing the corresponding block of image data of the previous frame into an upscaled block of image data of the current frame. The Examiner refers to column 5 of Challapali where it is stated that a redundant frame is not coded. Nowhere is it mentioned

that upscaled data is copied as Challapali never upscales any data. Applicants respectfully request that the Examiner point out where Challapali upscales image data if this rejection is maintained. With regard to claim 13, the Examiner asserts that Silver teaches the feature of determining whether a direction associated with a pixel is horizontal or vertical in columns 2 and 3 and claims 13 and 24. Applicants respectfully disagree. The cited section in columns 2 and 3 refer to determining a gradient direction to find local maximums along the gradient direction to determine if edges are present. This is not related to determining a horizontal or vertical direction for upscaling purposes.

The Examiner then asserts that one skilled in the art would modify Challapali as taught by Silver to reproduce a smooth video image without noise due to a smoothing effect through interpolation while preventing degradation edges in graphic image regions. Applicants respectfully disagree with this assertion as Silver teaches solely detecting edges. So even if Silver was combined with Challapali, there is nothing in Silver that teaches how to preserve edges in an upscaled video sequence. Neither Silver nor Challapali teach the preservation of edges in an upscaled image, and as such one skilled in the art would not have combined the references as suggested by the Examiner. Accordingly, claim 11, and dependent claims 12-15 are allowable over the cited references for at least the above stated reasons. Claims 23-26 are patentable over the cited references for at least the reasons stated above with regard to claim 11.

Claims 27 includes the feature of a scaling module configured to scale the decompressed video data, the scaling module including circuitry for identifying the coded block indicator for each block, the scaling module further including circuitry for adaptively applying a weighted interpolation scheme to a pixel location within a current frame when the coded block indicator is equal to the first value. The Examiner asserts that Challapali teaches a scaling module in column 5, lines 7-15. The cited section refers to a decoder and never mentions a scaling module. The Examiner also refers to claim 27 of Challapali. Challapali is limited to 23 claims and the Applicants respectfully request that the Examiner specify where a scaling module is disclosed in Challapali. As further specified in claim 27 of the present application, the scaling module includes circuitry for adaptively applying a weighted interpolation scheme. As stated above, neither Challapali nor Silver

disclose this feature and one would not have combined the references as suggested by the Examiner. Accordingly, claims 27-32 are allowable over the cited references.

Claim 16 was rejected as being unpatentable over Challapali in view of Silver further in view of Hsu. Claim 16 depends from claim 11, and as Hsu fails to cure the above noted deficiencies of Silver and Challapali, the Applicants respectfully request withdrawal of this rejection.

Claims 39-42 were rejected as being unpatentable over Silver in view of Challapali in further view of Hsu. Applicants respectfully request removal of this rejection in light of the arguments below. Claim 39 includes the feature of logic for applying a weighted interpolation scheme adaptively to a pixel location within the block of image data of the current frame based upon a direction associated with the pixel location, wherein the block of image data of the current frame is associated with a flag indicative of a level of difference with the corresponding block of image data of the previous frame. The Examiner refers to lines 58-61 of column 3 as teaching this feature. As discussed above, the Applicants respectfully disagree with this characterization. In addition, the method of Silver is not adaptive at all. In column 3, lines 58-61 a curve fitting is used when the magnitude estimates along the profile are collinear. As stated in column 4, lines 3-13, if the gradient magnitude estimates are not collinear, then the estimates are moved so that they lie along a chosen line, i.e., the estimates are made collinear. The curve fitting is then applied. Thus, the same interpolation technique is applied and there is no adaptive application as Silver forces the curve fitting technique whether the data is collinear or not.

Furthermore, the gradient direction is used to force the magnitude estimates in a line passing through G_0 (See column 3, line 19 through column 4, line 46) and not as a basis for applying a weighted interpolation scheme adaptively, as claimed in claims 11, 23, 27, and 39. Nowhere in Silver does it teach switching between interpolation techniques based upon the direction associated with the pixel location. In fact, Silver specifies that the methods are fast and computationally inexpensive. However the Examiner is ignoring this requirement when stating that Silver is to be modified to track video frames and calculate differences between the frames and then apply when the direction associated with the pixel excludes the weighted interpolation to provide a higher quality image display. One skilled

in the art would not have modified Silver in this manner since Silver is being applied to a still image and not a sequence of images. Furthermore, to modify Silver in the manner suggested by the Examiner would be computationally expensive, which is contrary to the basic objectives of Silver and is ignoring the teachings of Silver.

With regard to the rejection of claims 2, 5-8, 18, 21, 34, and 37, each of the claims are dependent claims and the corresponding independent claim for each of these dependent claims is discussed above. Since Hsu fails to cure any of the above noted deficiencies of the cited references, these dependent claims are allowable for at least these reasons.

In view of the foregoing, Applicant respectfully submits that all of the pending claims are in condition for allowance. A notice of allowance is respectfully requested. In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at (408) 952-6030.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration of the present application.

Respectfully submitted,

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